REMARKS:

This is in response to the Office Action dated July 6, 2001, which was paper #4 of the present application. Applicant cancels claims 20 and 29 of the present application without prejudice. Applicant amends claims 19, 28, and 38 of the application; marked up versions of the amended claims are attached hereto pursuant to 37 C.F.R. § 1.121(c)(ii). Pursuant to this amendment, claims 19, 21-28, and 30-45 are pending. Reexamination and reconsideration of the application are respectfully requested.

The Examiner rejects claims 19-45 under the judicially created doctrine of double patenting over claims 1-23 of U.S. Patent No. 6,157,428. Applicant respectfully submits a terminal disclaimer attached hereto with this amendment to address the Examiner's rejection.

The Examiner rejects claim 19 as obvious over U.S. Patent No. 5,166,816 to Kaneko *et al* in view of U.S. Patent No. 5,309,264 to Lien *et al*. Applicant amends claim 19 to address the Examiner's rejection.

In addition, the Examiner indicates that the term "can" respectively used in claims 20, 29, and 38 is not a positive limitation. Applicant cancels claims 20 and 29 and amends claim 38 to address this issue.

The present application describes a liquid crystal display (LCD) device having a high aperture ratio and a wide viewing angle. In one embodiment of the present application, the LCD device includes a TFT transistor formed on a first substrate, an interlayer insulation film formed to cover the TFT transistor, a patterned pixel electrode formed over the interlayer insulation film, and a first vertical alignment film formed to cover the pixel electrode and the interlayer insulation film. The pixel electrode is electrically connected to the source electrode of the TFT transistor via an opening. The LCD device further includes a transparent common electrode formed over a second substrate and a second vertical alignment film formed to cover the common electrode. The common electrode has a patterned opening forming an orientation control window for each corresponding

pixel electrode. When a voltage is applied on the LCD device, a weak electric field is generated in a sloped direction around the edges of the orientation control window. Since the tilt orientation of LCD molecules are influenced by the electric field applied thereon, LCD molecules are resultantly inclined in the opposite directions between both sides of the orientation control window. Therefore, the viewing angle of the LCD device is improved. See Application, FIG. 15, page 16, line 8-page 17, line 15.

Furthermore, the interlayer insulation film of the LCD device must have a thickness sufficiently large enough to shield the electric fields generated from the gate lines, the drain lines, and/or the TFT transistors from influencing the tilt orientation of the LCD molecules. Otherwise, the viewing quality of the LCD device might be adversely affected by these electric fields generated from the gate lines, the drain lines, and/or the TFT transistors. By having a sufficiently thick interlayer insulation film (e.g., at least 0.5 μm thick), the presently described LCD device avoids disturbance to the tilt orientation of the LCD molecules and the aperture ratio of the LCD device can also be significantly increased. See Application, FIGS. 5-8, page 23, line 24-page 26, line 4.

The Kaneko patent describes a LCD device having a plurality of pixel electrodes and a corresponding plurality of thin film transistors formed on a substrate. According to the Kaneko patent, its LCD device includes an interlayer insulation layer (e.g., the silicon nitride film 14 in FIG. 4 and the silicon nitride film 58 in FIG. 5) for electrically separating the pixel electrode from other electrodes of the TFT transistor, thereby preventing the short circuiting between these electrodes. See col. 2, lines 29-43 of the Kaneko patent. The interlayer insulation layer of Kaneko's LCD device is, however, very thin (i.e., 300Å and 1000 Å, i.e., 0.03 and 0.1 μm, respectively in FIGS. 4 and 5, which are much thinner than the interlayer insulation film, i.e., at least 0.5 μm, described in the present application). See col. 3, lines 10-11 and col. 4, lines 41-42 thereof. Thus, the interlayer insulation layer of the Kaneko patent is aimed to protect the pixel electrode from short circuiting with other electrodes of the TFT transistor only, and it does not provide

any shielding protection to the LCD molecules from being influenced by the electric fields from the gate lines, the drain lines, and/or the TFT transistors. As a result, the present application distinguishes over the Kaneko patent.

The Lien patent describes a LCD device having a common electrode with one or more patterned cutouts corresponding to each pixel electrode. The LCD device according to the Lien patent, therefore, defines multiple domain areas in each pixel. In each domain, the director of the LCD molecules is always aligned so as to tilt in a direction toward the center of the pixel when an electric field is applied. See FIG. 2, col. 4, lines 1-36 of the Lien patent. As a result, the Lien's LCD device improves its viewing quality from a variety of view angles. Similar to the Kaneko patent, the Lien patent nevertheless does not teach or suggest an interlayer insulation film having a thickness sufficiently large enough to shield the electric fields generated from the gate lines, the drain lines, and/or the TFT transistors from influencing the tilt orientation of the LCD molecules. Therefore, applicant submits that the present application distinguishes over the Kaneko patent and the Lien patent, either taken alone or in combination.

Claim 19 of the present application recites, in pertinent part, "orientation direction of liquid crystal is divided by weak electric fields and/or electri elds in a sloped direction generated by the orientation control window, and th nterlayer insulation film has a thickness sufficient to alleviate an influence o the liquid crystal layer from an electric field generated by the thin film transist s, the gate lines, and the drain lines." As discussed, neither the Kaneko patent or the Lien patent describes this limitation of claim 19. Thus, claim 19 distingu hes over the Kaneko patent and the Lien patent and is in condition for allowance.

Claim 20 is cancelled.

Claims 21-27 depend on claim 19. Thus, claims 21-27 similarly distinguish over the art of record and are in condition for allowance.

Claim 29 is cancelled.

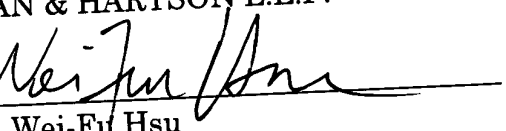
Applicant submits that pending claims 28 and 30-45 also distinguish over the art of record and are in condition for allowance.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6870 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

By: 
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Version with markings to show changes made:

19. (Amended) A liquid crystal display, comprising:

a first substrate;

a plurality of gate lines and drain lines formed on the first substrate;

thin film transistors each arranged at an intersection between a corresponding gate line and a corresponding drain line, and having a gate connected to the corresponding gate line, a drain connected to the corresponding drain line, and a source;

an interlayer insulation film formed covering the thin film transistors, the gate lines, and the drain lines;

a plurality of pixel electrodes each connected to the source of the thin film transistor and partially formed on the interlayer insulation film;

a second substrate disposed opposite the first substrate;

a liquid crystal layer arranged between the first and second substrates;

a common electrode formed on the second substrate; and

an orientation control window created in the common electrode; wherein

orientation direction of liquid crystal is divided by weak electric fields and/or electric fields in a sloped direction generated by the orientation control window, and the interlayer insulation film has a thickness sufficient to alleviate an influence on the liquid crystal layer from an electric field generated by the thin film transistors, the gate lines, and the drain lines.

28. (Amended) A liquid crystal display, comprising:

a first substrate;

a plurality of gate lines and drain lines formed on the first substrate;

thin film transistors each arranged at an intersection between a corresponding gate line and a corresponding drain line, and having a gate connected to the corresponding gate line, a drain connected to the corresponding drain line, and a source;

an interlayer insulation film formed covering the thin film transistors, the gate lines, and the drain lines;

a plurality of pixel electrodes each connected to the source of the corresponding thin film transistor and partially formed on the interlayer insulation film;

a second substrate disposed opposing the first substrate;

a liquid crystal layer arranged between the first and second substrates;

a common electrode formed on the second substrate; and

an orientation dividing portion for dividing an orientation direction of liquid crystal by generating weak electric fields and/or electric fields in a sloped direction, wherein the interlayer insulation film has a thickness sufficient to alleviate an influence on the liquid crystal layer from an electric field generated by the thin film transistors, the gate lines, and the drain lines.

38. (Amended) The liquid crystal display as claimed in claim 37, wherein the interlayer insulation film has a thickness [which can] sufficient to alleviate an influence on the liquid crystal layer by an electric field generated by the thin film transistors, the gate lines, and the drain lines.